

What is claimed is.

[1] A treatment process of a solution containing an organic compound having a fluorocarbon chain (hereinafter said to as the fluorine compound), the process comprising,  
 adding divalent and trivalent metal salts to said solution,  
 forming a layered double hydroxide having the fluorine compound between layers to absorb and fix the fluorine compound.

[2] A treatment process of a solution containing the fluorine compound, the process comprising,  
 adding divalent and trivalent metal salts to said solution,  
 precipitating a layered double hydroxide having the fluorine compound between layers,  
 separating a solid part by the solid-liquid separation,  
 dissolving said separated solid part in an acid, and  
 separating the fluorine compound or its salt.

[3] The treatment process of the solution containing the fluorine compound according to claims [1] or [2], the process further comprising,  
 adjusting pH of the solution to more than 4,  
 precipitating the layered double hydroxide having the fluorine compound between layers.

[4] The treatment process of the solution containing the fluorine compound according to claims [1] or [2], the process further comprising,  
 adding an alkali to the solution to adjust pH from 4 to 12,  
 adding divalent and trivalent metal salts to said solution  
 precipitating the layered double hydroxide having the fluorine compound

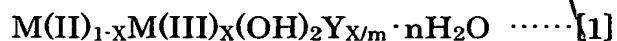
*Abstract*  
between layers.

[5] The treatment process of the solution containing the fluorine compound according to any one of claims [1] to [4], wherein the divalent metal salt is a salt of magnesium, calcium, zinc, nickel, copper, manganese (divalent), or cobalt (divalent), and the trivalent metal salt is a salt of aluminum, iron, chromium, manganese (trivalent), cobalt (trivalent), potassium, lanthanum, or scandium.

[6] The treatment process of the solution containing the fluorine compound according to any one of claims [1] to [5], wherein the divalent and the trivalent metal salts are chlorides.

[7] The treatment process of the solution containing the fluorine compound according to any one of claims [1] to [6], wherein the fluorine compound is carboxylic acid or sulfonic acid having the fluorocarbon chain, in which the number of carbon is more than 5.

[8] The treatment process of the solution containing the fluorine compound according to any one of claims [1] to [7], wherein the layered double hydroxide having the fluorine compound between layers is shown in the following formula [1].



where, Y is an anion having valence number m of the fluorine compound having the fluorocarbon chain, M(II) is a divalent metal ion, M(III) is a trivalent metal ion, X is 0.1 to 0.5, and n is 0 or positive integer.

[9] A treatment process for recovering the fluorine compound and its salts, the process comprising, precipitating the layered double hydroxide by the treatment process

*about*

according to any one of claims [1] to [7],  
recovering the solid part by the solid-liquid separation,  
dissolving said recovered solid part in a mineral acid to recover the  
separated fluorine compound or its salts, or  
heating said mineral acid dissolving the recovered solid part,  
putting quietly to separate an oil layer, and  
taking out the oil layer to recover the fluorine compound and its salts.

[10] A treatment process for recovering a fluorine compound and its  
salts, the process comprising,  
precipitating the layered double hydroxide by the treatment process  
according to any one of claims [1] to [7],  
recovering the solid part by the solid-liquid separation,  
dispersing the recovered solid part to an organic solvent, and  
filtering an insoluble part from said solvent.

[11] A layered double hydroxide shown by above-mentioned formula  
[1], which contains the fluorine compound between layers and is formed by  
adding the divalent and trivalent metal salts to the solution containing the  
fluorine compound having the fluorocarbon chain.

*Add  
A2*

Table 1

No.	Fluorine Compound Solution			Additional Metal Salt		Solution pH	Precipitate		
	Kinds	Concentration, Amount	Amount of Anion	Divalent	Trivalent		Amount	Anion Concentration	Anion Fixing Ratio
1	Per-fluoro-octanoic acid ammonium ( $C_7F_{15}COONH_4$ )	Aqueous solution of 0.1%, 1000ml	2.32mmol	Zn 4.64mmol	Al 2.32mmol	7	1.50 g	2.23mmol	96.1%
2	Ditto	Aqueous solution of 0.1%, 100ml Aqueous solution of 0.01%, 1000ml	2.32mmol 0.232mmol	Zn: 4.64mmol Zn: 0.464mmol	Al: 2.32mmol Al: 0.232mmol	7	1.50 g 0.15 g	2.3mmol 0.21mmol	99.1% 91.0%
3	Ditto	Aqueous solution of 0.1%, 1000ml	2.32mmol	Zn 4.64mmol	Al 2.32mmol	5	1.50 g	2.27mmol	98%
4	Ditto	Aqueous solution of 0.1%, 1000ml	2.32mmol	Mg 4.64mmol	Al 2.32mmol	10	1.10 g	1.4mmol	80%
5	Ditto	Aqueous solution of 0.1%, 1000ml	2.32mmol	Ca 4.64mmol	Al 2.32mmol	10	0.85 g	2.3mmol	60%
6	Per-fluoro-octyl-sulfonic acid ammonium ( $C_8F_{17}SO_3NH_4$ )	Aqueous solution of 0.1%, 1200ml	2.32mmol	Zn 4.64mmol	Al 2.32mmol	7	1.70 g	2.23mmol	99%
7	Per-fluoro-octyl-sulfonic acid lithium ( $C_8F_{17}SO_3Li$ )	Aqueous solution of 0.1%, 1174ml	2.32mmol	Zn 4.64mmol	Al 2.32mmol	7	1.65 g	2.21mmol	95%
10	Per-fluoro-decanoic acid ammonium ( $C_9F_{19}COONH_4$ )	Aqueous solution of 0.005%, 1000ml	1.16mmol	Zn 2.32mmol	Al 1.16mmol	7	0.84 g	1.09mmol	94%